Memory Board Option Installation Guide

with Testing Procedures

digital™

EK-RBMXE-IN-002

Rainbow™

Memory Board Option Installation Guide

with Testing Procedures

digital equipment corporation

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Preface

This book gives instructions for installing and testing your Rainbow™ memory board option. To install and test the option correctly, you should follow the steps in order. If you need help when installing or testing the option, do not hesitate to call the Help Line number:

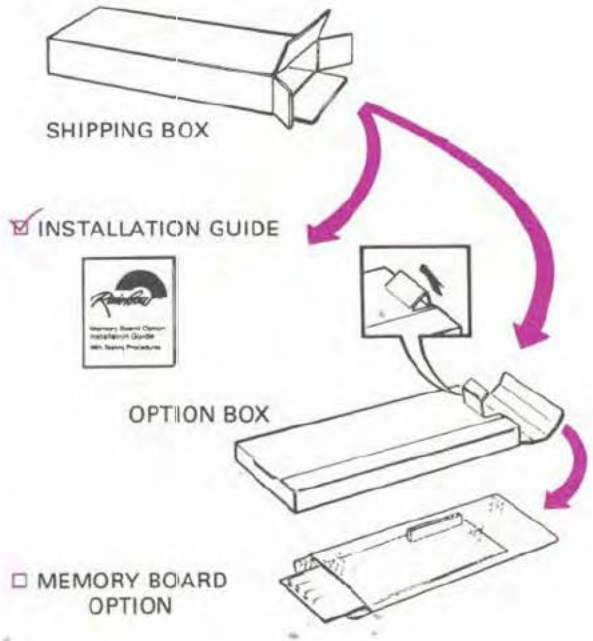
800-DEC-8000

Allow one hour or more for the installation. If you discover any damage:

- Call your sales representative
- Call your delivery agent

Unpacking and Preparation

Unpack the shipping box.

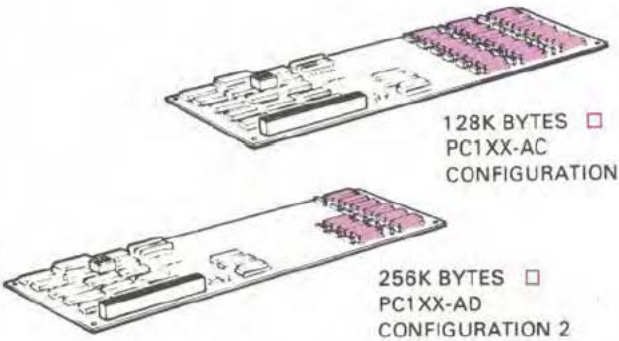


Unpack the memory board option.

There are two standard factory configurations of the memory board option.

Check ☑ which memory board you have. You will need this information later.

MEMORY BOARD OPTIONS



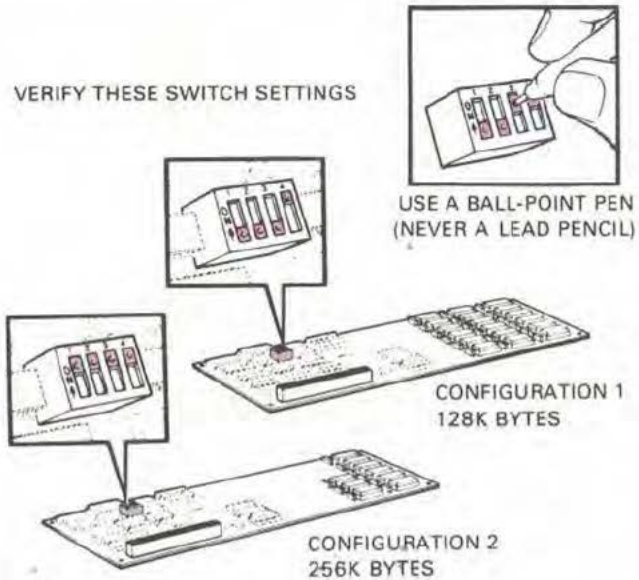
128K BYTES ☐
PC1XX-AC
CONFIGURATION 1

256K BYTES ☐
PC1XX-AD
CONFIGURATION 2

Check the memory switch for correct switch settings.

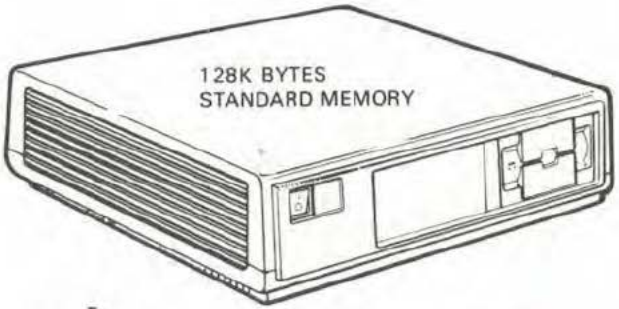
NOTE
The first three switch positions select the type of memory chips installed on the memory board. Switch number 4 must always remain ON.

If you have a memory upgrade, follow the instructions in the *Rainbow™ Memory Upgrade Kit Installation Guide* and add the memory chips. Adding memory chips may change your configuration number. Find your new configuration number. Refer to page 49 of this book, and record this new number here ____.

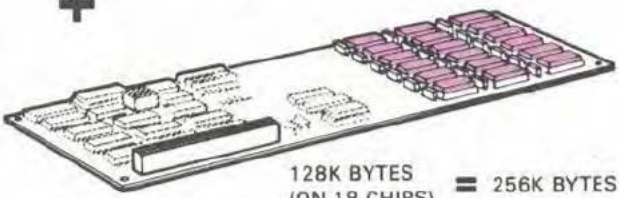


Determine the new memory size.

Check ☑ the appropriate box.

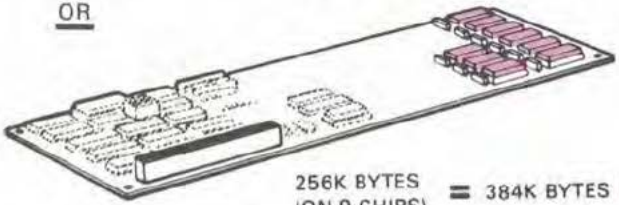


+



128K BYTES (ON 18 CHIPS) = 256K BYTES ☐

OR

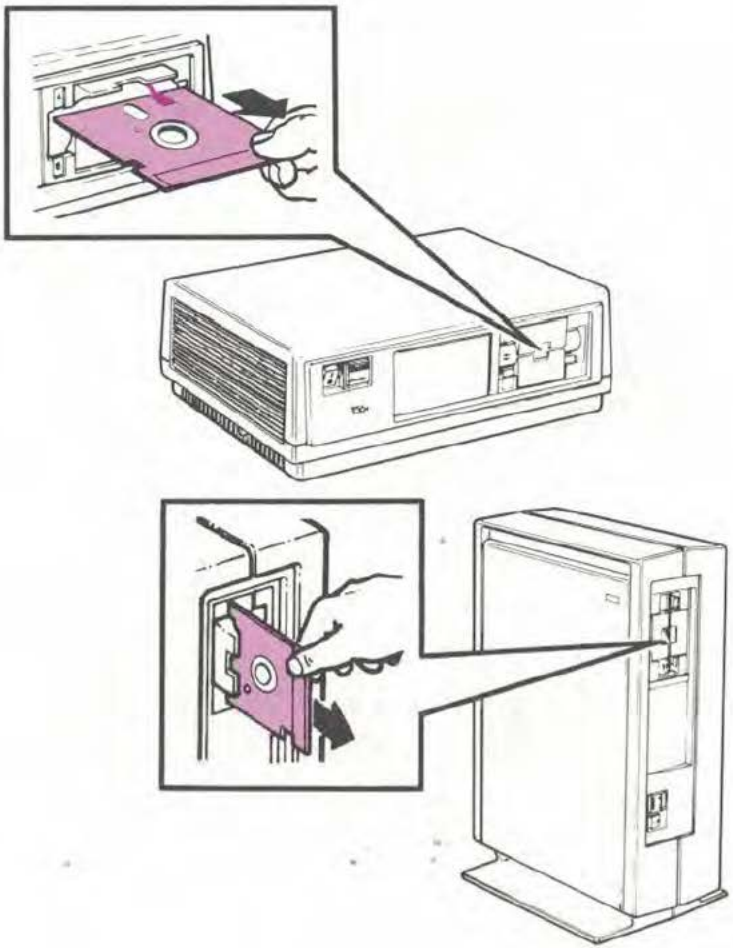


256K BYTES (ON 9 CHIPS) = 384K BYTES ☐

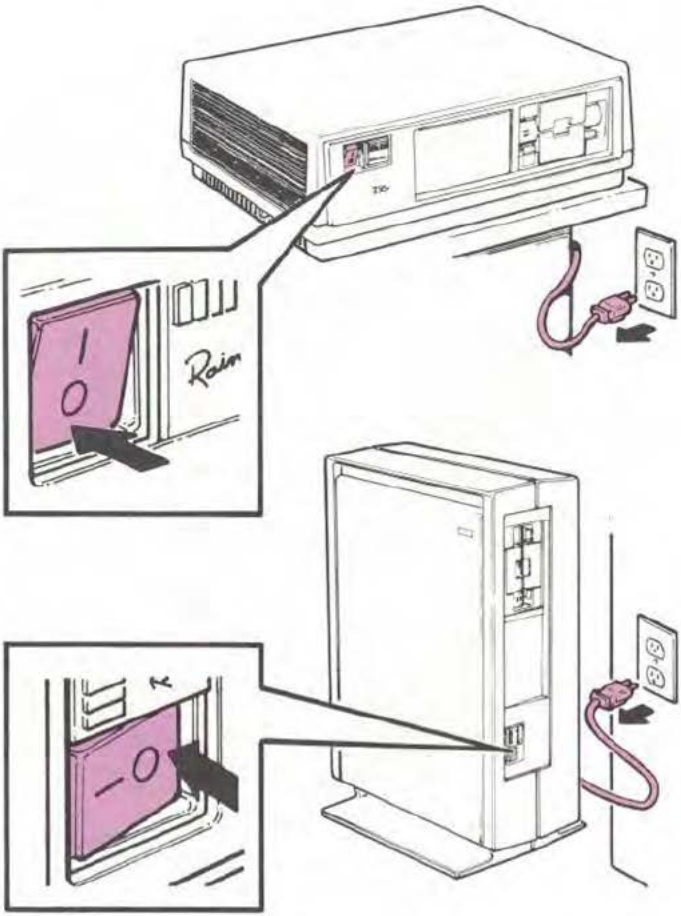
+

OPTIONAL MEMORY CHIPS = ____ BYTES

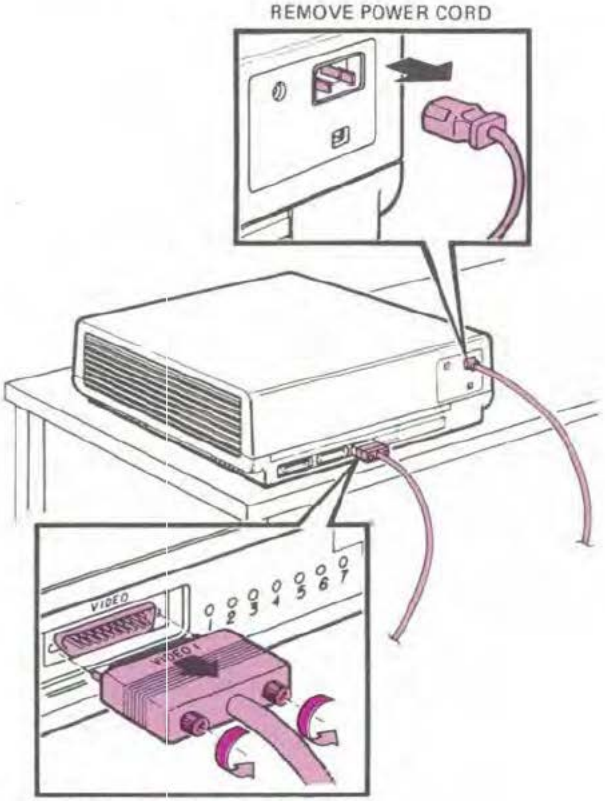
Open the diskette drive doors and remove any diskettes from the diskette drives. Close the diskette drive doors.



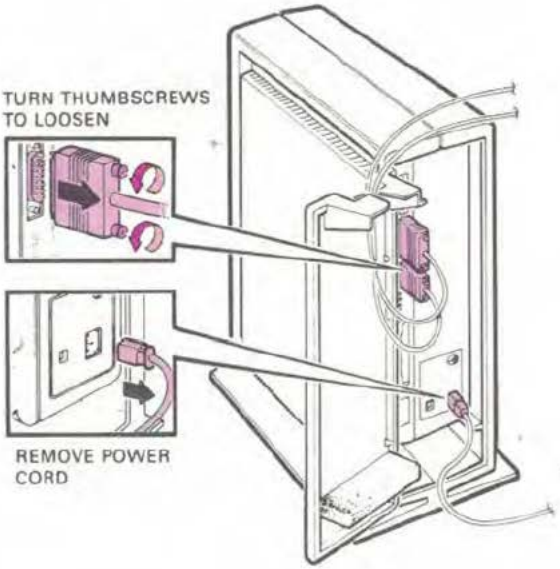
Set the power switch to zero (off) and unplug the power cord.



If you do not have a floor stand, remove the power cord and all cables from the system unit; then, go to page 11.

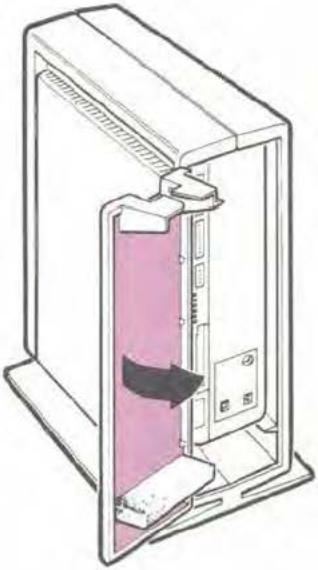


If you have a floor stand, open its rear door and remove the power cord and all cables from the system unit.



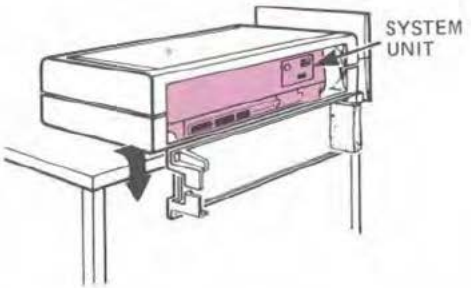
Close the rear door of the floor stand and place it on a desk so that its door opens downward.

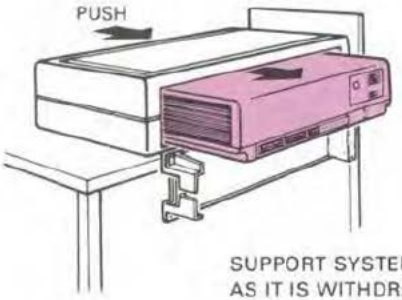
CAUTION
The system weighs 21.8 kg (48 lb). Two people should lift the unit.



Open the rear door of the floor stand and remove the system unit.

- Open the door.
- Lift and slide the system unit out of the stand and place it on a desk.

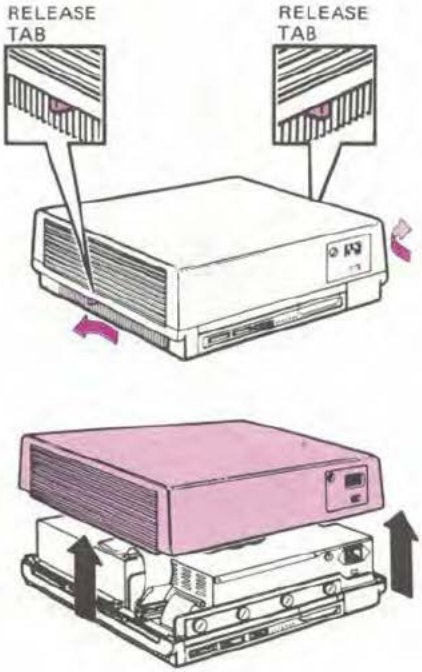




SUPPORT SYSTEM UNIT
AS IT IS WITHDRAWN

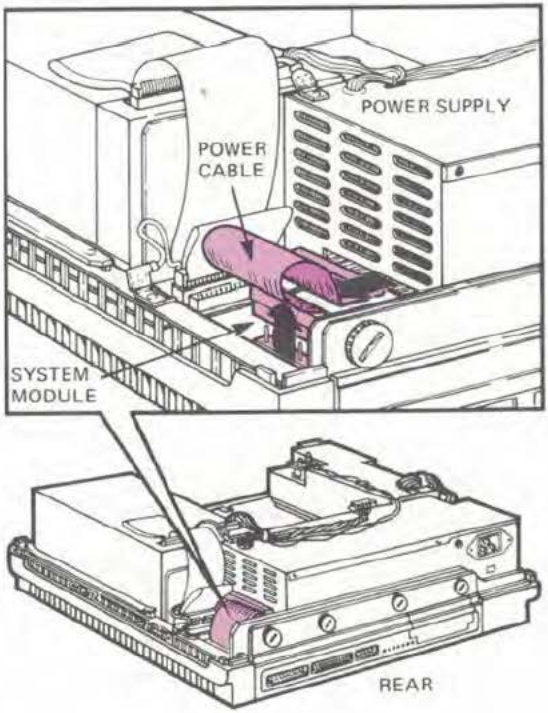
Remove the top cover from the system unit.

- Locate the two cover release tabs. Slide the tabs away from you and out.
- Lift the cover straight up and put it aside.



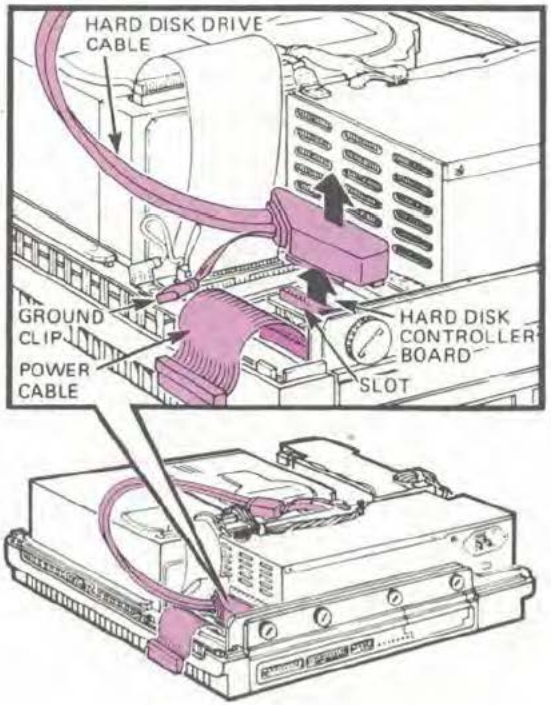
Remove the power cable.

First, remove the power cable from the power supply; then, if you do not have a hard disk drive, remove it from the system module.



If you have a hard disk drive . . .

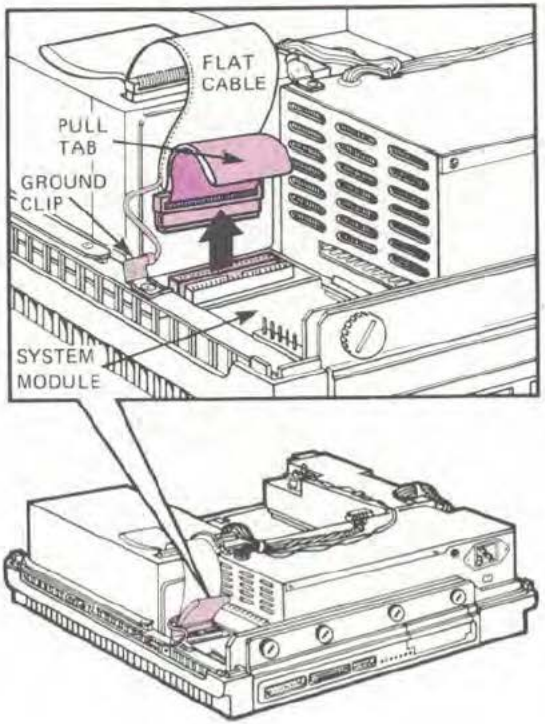
- Disconnect the hard disk drive cable from the hard disk controller board, leaving the ground clip attached.
- Remove the power cable from the system module.



Disconnect the diskette drive flat cable from the system module.

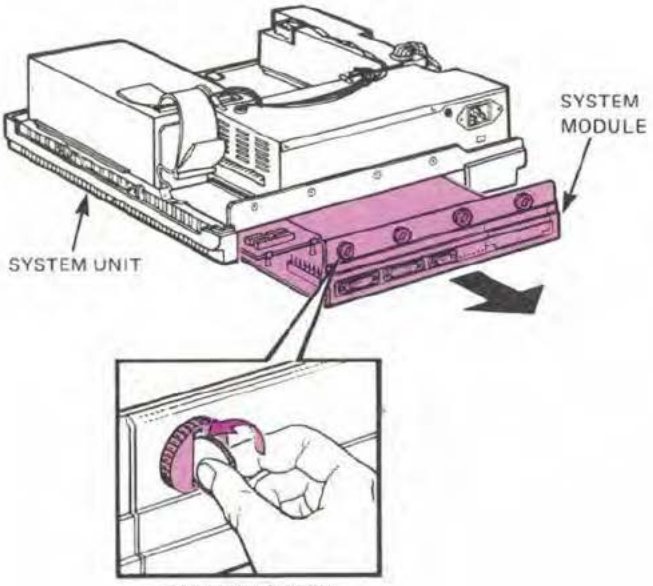
Leave the ground clip attached.

NOTE
If you have a cable from a second diskette drive, disconnect it from the system module.



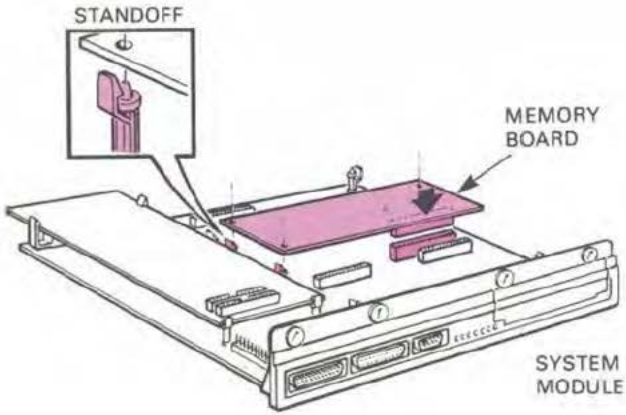
Remove the system module.

- On the rear panel, use a coin to slightly loosen each screw in turn.
- Repeat until all screws are loose and you can slide the system module out of the system unit.



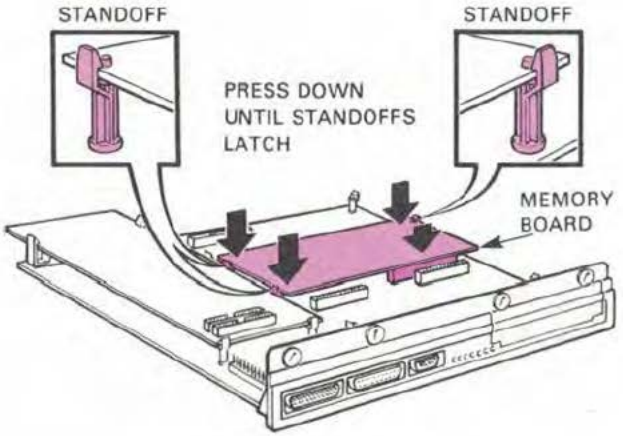
Install your new memory board.

Position the memory board, component-side down, over the standoffs and the 40-pin connector.



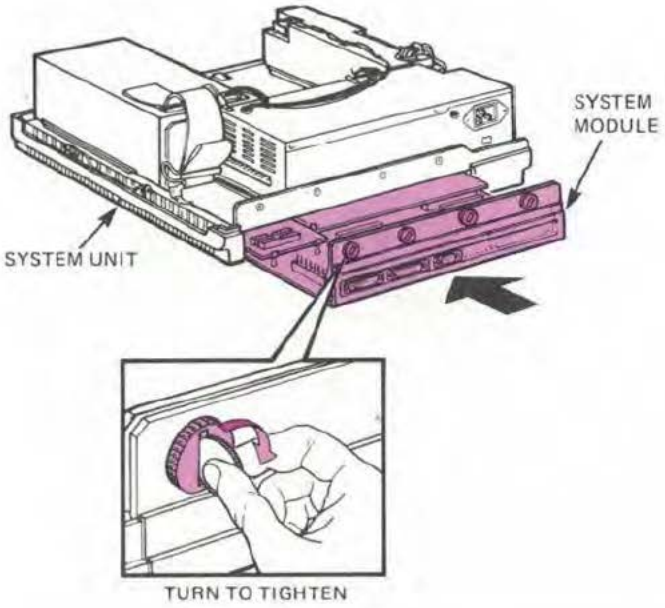
Press down firmly.

Press the memory board down *firmly* at each standoff and at the 40-pin connector.



Replace the system module.

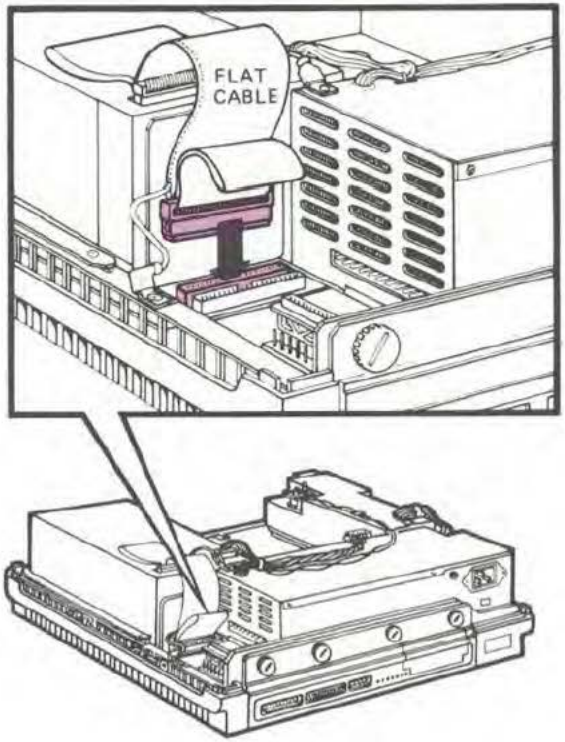
- Place the system module in the guides and slide it into the system unit.
- Use your fingers to locate and slightly tighten each screw in turn; then, use a coin to tighten each screw *firmly*.



Reconnect the diskette drive flat cable.

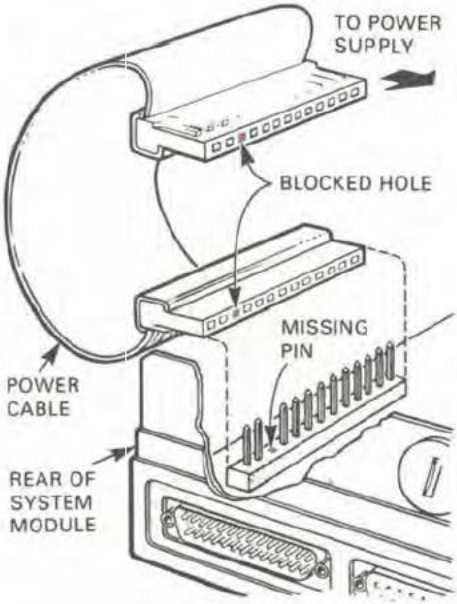
Install the flat cable into its connector.

NOTE
If you have a cable for a second drive, connect it to the system module.



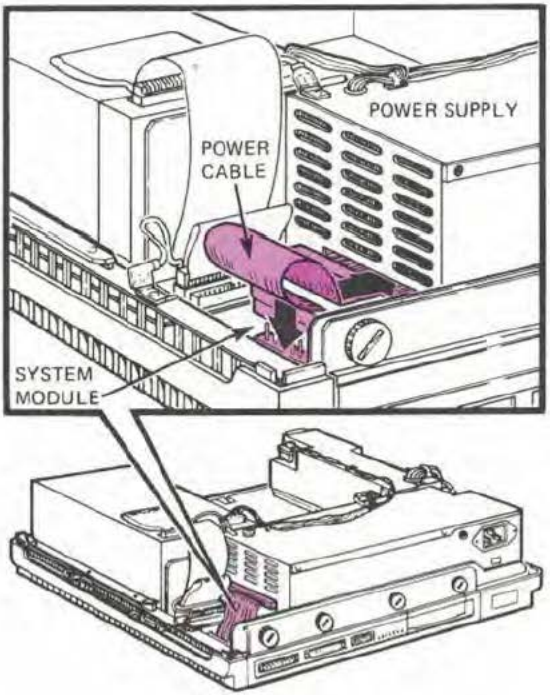
Identify the locating keys on the power cable.

Match the blocked hole in the power cable connector with the missing connector pin on the system module.



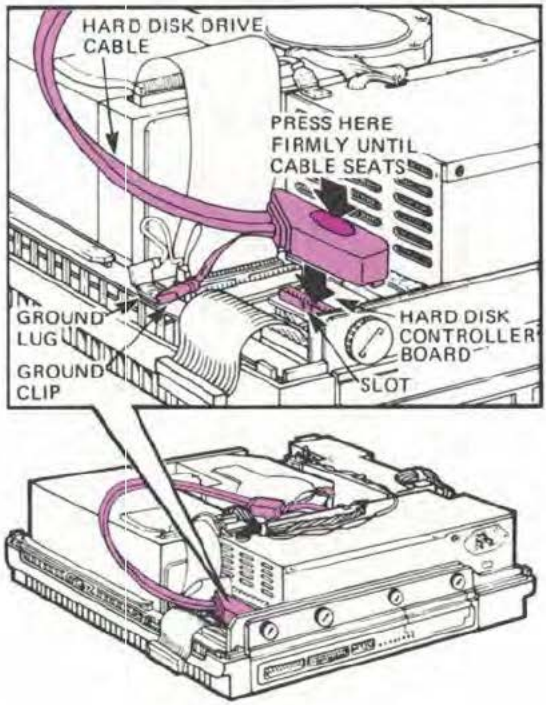
Install the power cable.

First, connect the power cable to the system module connector; then, if you do not a have hard disk drive, connect it *firmly* to the power supply.

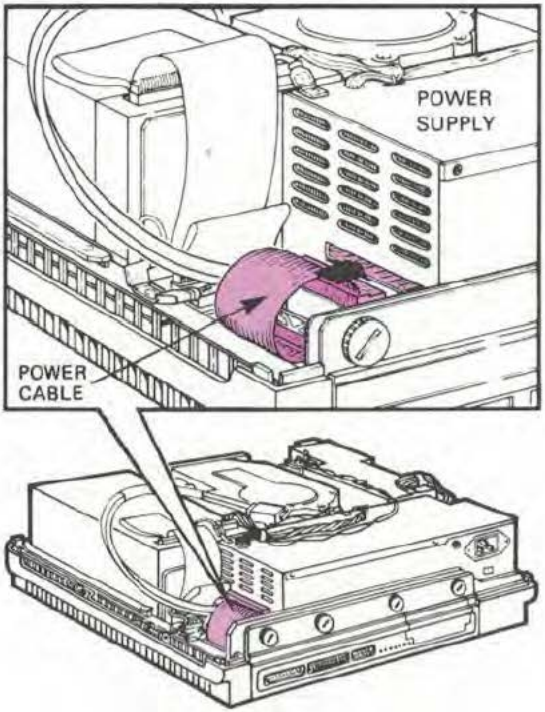


If you have a hard disk drive . . .

Reconnect the hard disk drive cable to the connector on the hard disk controller board. Press the cable *firmly* as shown until it is fully seated and is level.



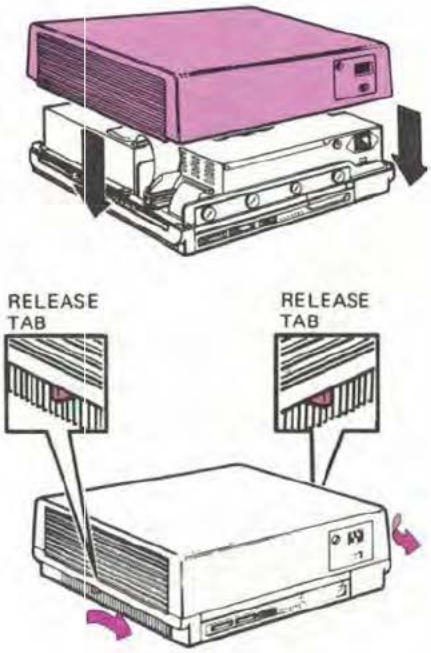
After you connect the hard disk drive cable, plug the power cable *firmly* into the power supply.



Replace the top cover on the system unit.

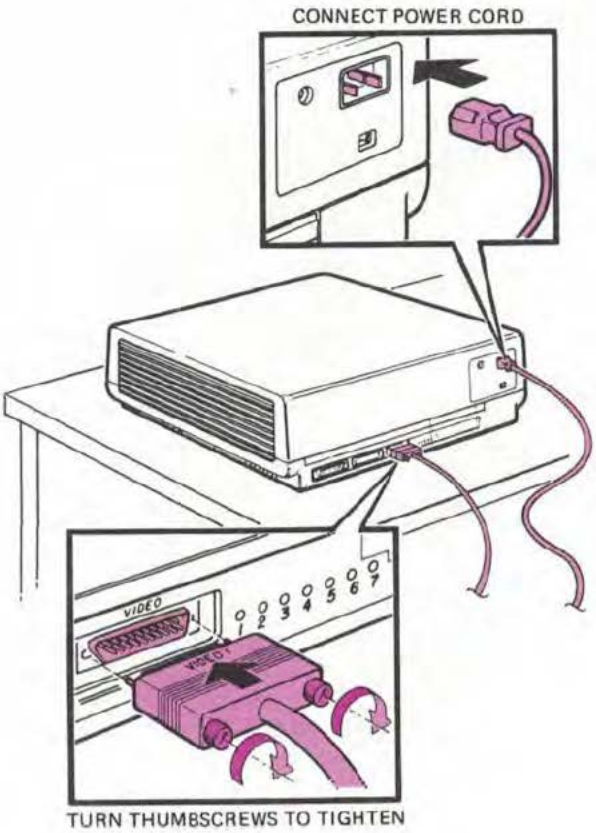
If the cover does not seat correctly:

- Make sure the screws on the system module are tight.
- Check that the cover release tabs are positioned correctly.
- Push the cover release tabs in and toward you. Try lifting the cover to make sure it is secure.

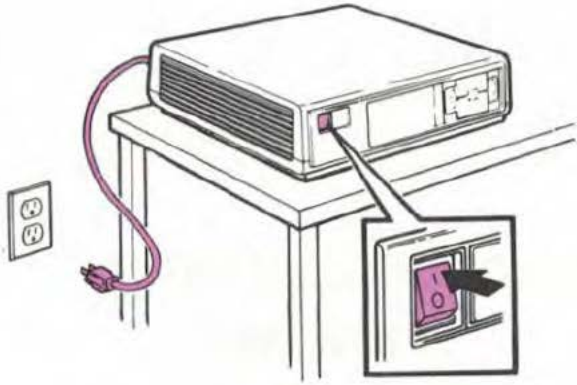


Connect all cables and the power cord to the system unit.

NOTE
Make sure the power switch is set to 0 (off).



Plug in the power cord and set the power switch to 1 (on).



After a pause, you will hear a whir and a beep; then, you will see the following message.

See Owner's Manual — MESSAGE 24 — New Memory Size = nnnK.

The letters **nnnK** represent your total memory size. Compare your total memory size with the new total memory value you checked on page 4.

See Owner's Manual — MESSAGE 24 — New Memory Size nnnK
digital
Rainbow 100
Version 04.03L
Copyright (c) Digital Equipment Corporation 1983
All Rights Reserved
Press A, B, C, D, W, S, or T
A = start from Drive A
B = start from Drive B
C = start from Drive C
D = start from Drive D
W = start from Drive W
S = execute Self Test
T = enter Terminal Mode

The computer may display a different message, such as:

See Owner's Manual — MESSAGE 27 — Memory Board
or
See Owner's Manual — MESSAGE 2 — Main Board

The computer does *not* display the Main System Menu with either of these messages. To display the menu, press the **Set-Up** key, then hold down the **Ctrl** key and press the **Set-Up** key again. You must display the Main System Menu in order to test the memory board.

NOTES

The computer displays the new memory size message *ONLY ONCE* when you power up after installing a new board. The computer displays the Main System Menu beneath the new memory size.

If the new memory size is incorrect, go to the testing procedure on page 31 to identify the failure.

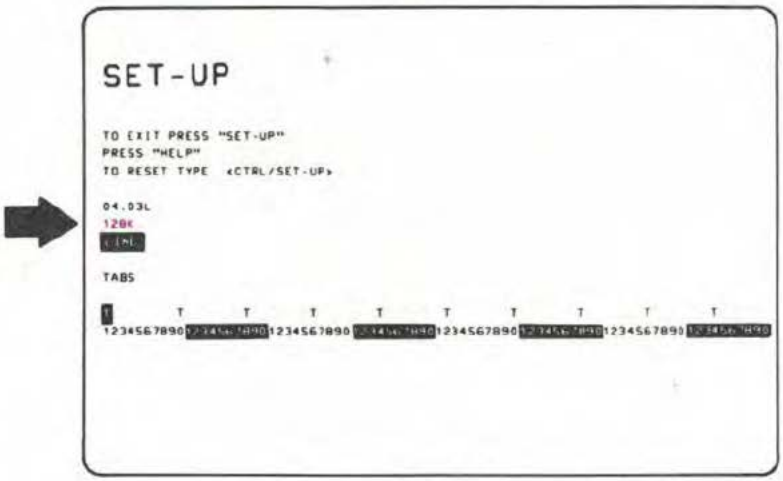
If the new memory size is not visible, check all power cable connections.

If the computer does not display the Main System Menu, refer to Chapter 6, Troubleshooting, in your *Rainbow™ Owner's Manual.*

The version number shown on the screens in this book may differ from that on your computer.

Check the memory size.

In the future, to check the size of your Rainbow computer's memory, press the **Set-Up** key. The computer will display the total memory size on the Set-Up screen.



Testing

This chapter describes the procedure you should follow to test the Rainbow memory board option when you first install it, or when you increase the size of the memory by adding memory upgrade chips. In addition, if you suspect the memory board or the upgrade chips are faulty, you can use this procedure to identify the problem.

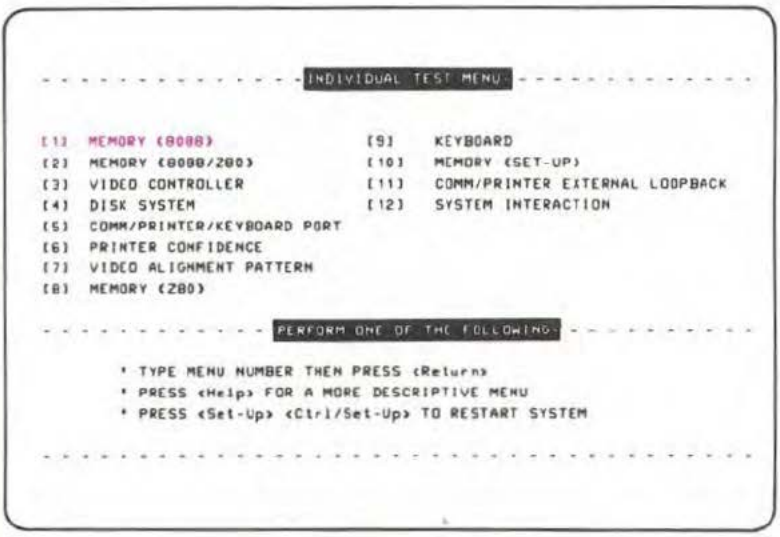
To begin the testing procedure . . .

- Find the Rainbow diagnostic diskette in your system kit. Open the door of diskette drive A and load the diskette into the drive. Close the door.
- Type **A** and press the **Return** key.
- The computer displays the Main Diagnostic Menu.
- Type **3** and press the **Return** key to display the Individual Test Menu.

Rainbow 100 Diagnostic Diskette VERSION 2.0 mo/da/yr
Copyright (c) 1983 Digital Equipment Corporation
MAIN DIAGNOSTIC MENU
[1] TEST DRIVES A AND B
[2] TEST COMPUTER
[3] DISPLAY INDIVIDUAL TEST MENU
[4] INSTALL NEW DIAGNOSTIC
PERFORM ONE OF THE FOLLOWING
* TYPE MENU NUMBER THEN PRESS <Return> [■]
* PRESS <Help> FOR A MORE DESCRIPTIVE MENU
* PRESS <Set-Up> <Ctrl/Set-Up> TO RESTART SYSTEM

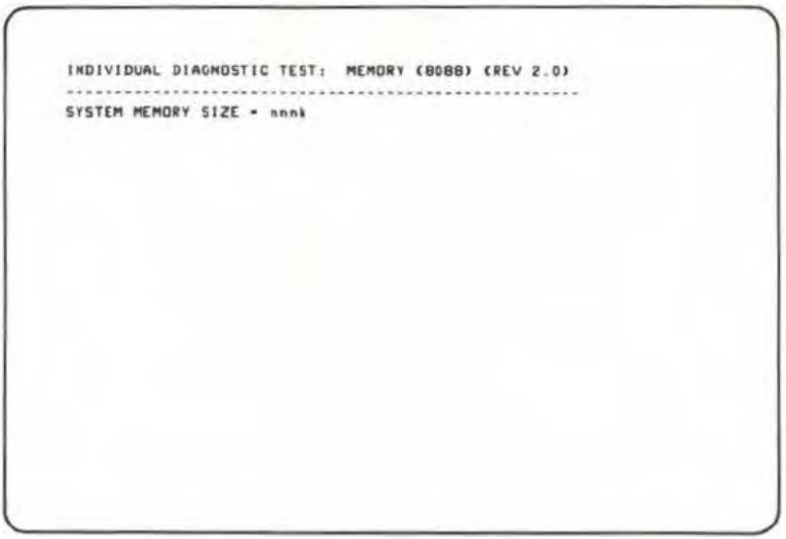
Select test.

Type **1** to select the first test: Memory (8088).



Run test.

Press the **Return** key to run test 1. The test sizes the memory and checks the installation of the memory chips. While the test is running, the computer displays the following screen.



The letters **nnnK** represent your total memory size as you marked on page 4.

A Successful Test

If the memory test is successful, the computer displays the Main Diagnostic Menu with the following message.

PREVIOUSLY RUN INDIVIDUAL TEST — PASSED

NOTE
The memory test may take as long as 30 minutes depending on the size of your memory.

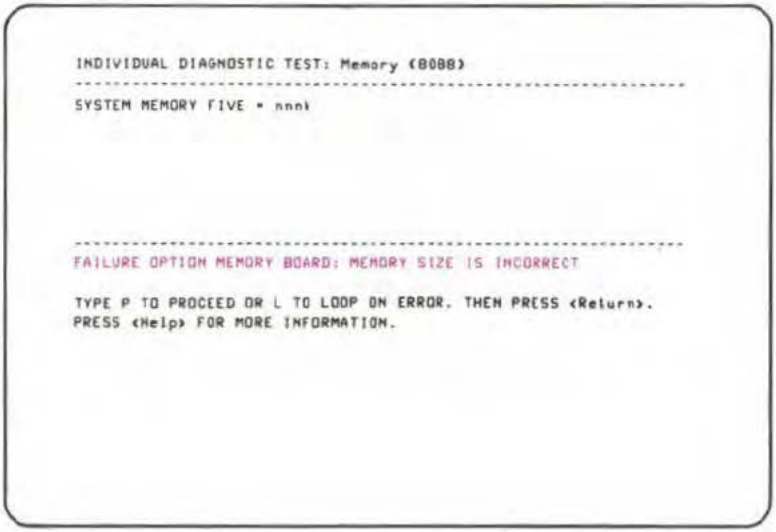
Rainbow 100 Diagnostic Diskette VERSION 2.0 mo/da/yr
Copyright (c) 1983 Digital Equipment Corporation
MAIN DIAGNOSTIC MENU
[1] TEST DRIVES A AND B
[2] TEST COMPUTER
[3] DISPLAY INDIVIDUAL TEST MENU
[4] INSTALL NEW DIAGNOSTIC
PERFORM ONE OF THE FOLLOWING
* TYPE MENU NUMBER THEN PRESS <Return> [0]
* PRESS <Help> FOR A MORE DESCRIPTIVE MENU
* PRESS <Set-Up> <Ctrl/Set-Up> TO RESTART SYSTEM
PREVIOUSLY RUN INDIVIDUAL TEST - PASSED

An Unsuccessful Test

If you see the message:

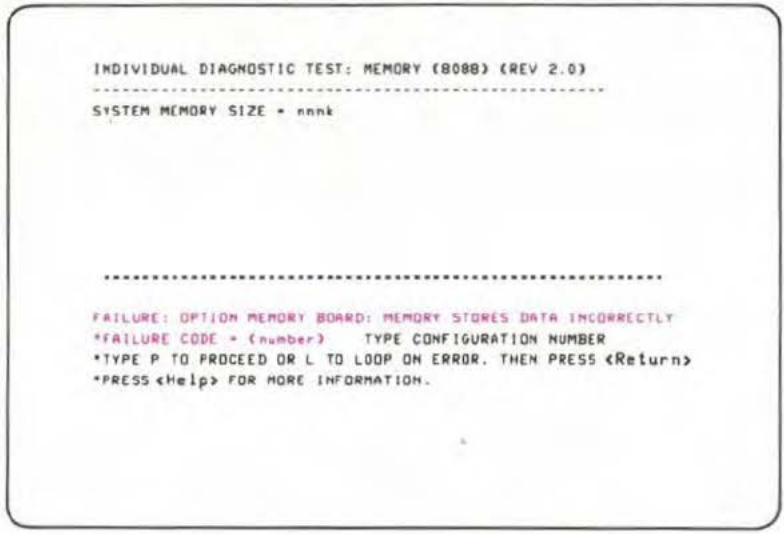
FAILURE: OPTION MEMORY BOARD:
MEMORY SIZE IS INCORRECT

type **P** and press the **Return** key. Repeat this as many times as necessary until the testing restarts and the computer displays a failure code.


INDIVIDUAL DIAGNOSTIC TEST: Memory (8088)
SYSTEM MEMORY FIVE = nnn
FAILURE OPTION MEMORY BOARD: MEMORY SIZE IS INCORRECT
TYPE P TO PROCEED OR L TO LOOP ON ERROR. THEN PRESS <Return>.
PRESS <Help> FOR MORE INFORMATION.

Failure Messages and Codes

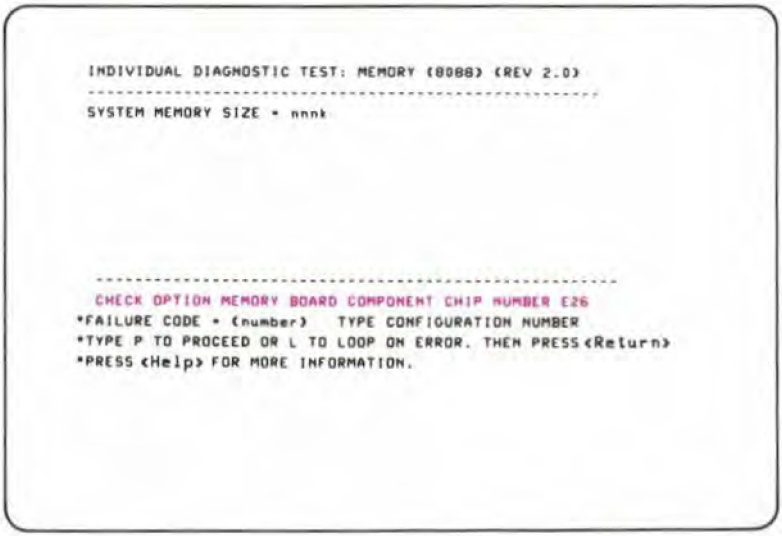
If a memory chip is inserted backward, has a bent leg, is the wrong size, or is otherwise faulty, the computer displays a failure message and failure code number on the screen, as shown in the following example.


INDIVIDUAL DIAGNOSTIC TEST: MEMORY (8088) (REV 2.0)
SYSTEM MEMORY SIZE = nnnk
FAILURE: OPTION MEMORY BOARD: MEMORY STORES DATA INCORRECTLY
*FAILURE CODE = (number) TYPE CONFIGURATION NUMBER
*TYPE P TO PROCEED OR L TO LOOP ON ERROR. THEN PRESS <Return>
*PRESS <Help> FOR MORE INFORMATION.

Determine which chip is failing.

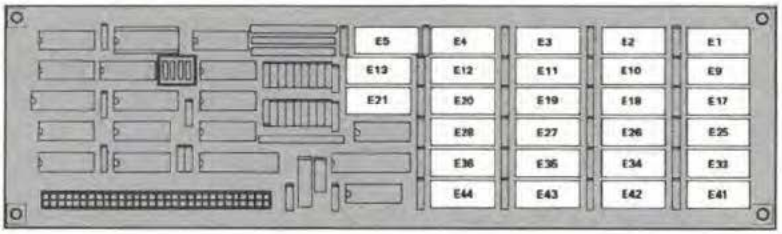
If you added a new memory board, your configuration number is 1 or 2. If you added a set of memory upgrade chips, your configuration number is the one you recorded on page 3.

- Type your memory board configuration number and press the **Return** key.
- The computer will display the failing component chip number on the screen as shown in the following example.
- To identify the location of the faulty chip on the memory board, see page 39.


INDIVIDUAL DIAGNOSTIC TEST: MEMORY (8088) (REV 2.0)
SYSTEM MEMORY SIZE = nnnk
CHECK OPTION MEMORY BOARD COMPONENT CHIP NUMBER E26
*FAILURE CODE = (number) TYPE CONFIGURATION NUMBER
*TYPE P TO PROCEED OR L TO LOOP ON ERROR. THEN PRESS <Return>
*PRESS <Help> FOR MORE INFORMATION.

Identify the faulty chip location.

Note the E number displayed on your screen. Locate and highlight it on the figure below for reference.



Configuration Number Unknown

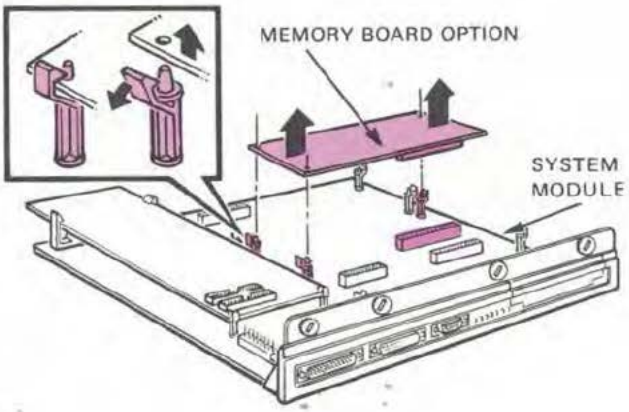
If you do not know the configuration of your memory board, you must remove power to the Rainbow computer and remove the memory board from the system module. To determine the configuration number, refer to page 49 of this book.

When you know the configuration number, you can determine the faulty chip location on the memory board by using the chart on page 60.

Make sure you note your configuration number on page 3 for future reference.

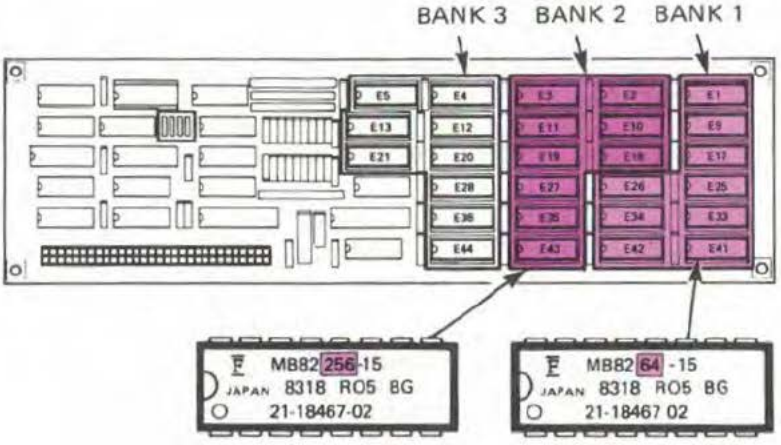
Remove the memory board option.

- Set the power switch to 0 (off), unplug the power cord, and remove the system module (see pages 5 through 15 for instructions).
- Press outward on the three standoffs and lift the memory board option off the system module.



Check memory size.

- To check that all nine chips in each bank are the same memory size, place the memory board option in front of you as shown below.
- Make sure that the numbers on the chips in each bank are the same, either 64 or 256. The numbers must be the same size within a bank, but each bank size may differ from the next. For example, 64K chips may be in bank 1, and 256K chips may be in bank 2.

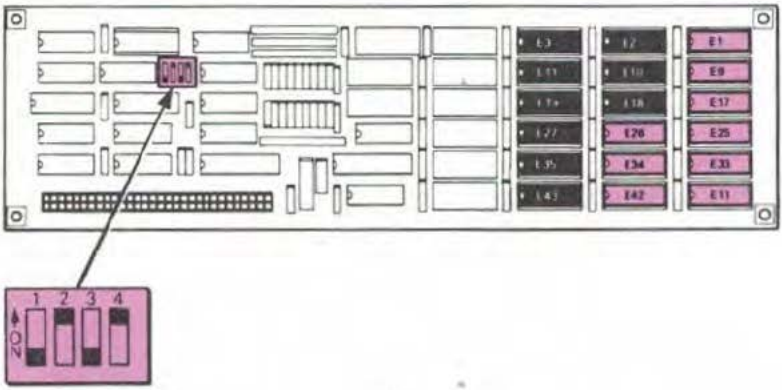


Check switch settings.

- Use the table below to check that the memory board switch settings are correct or refer to page 49 of this book.
- Make sure all chips are positioned correctly (see page 44).

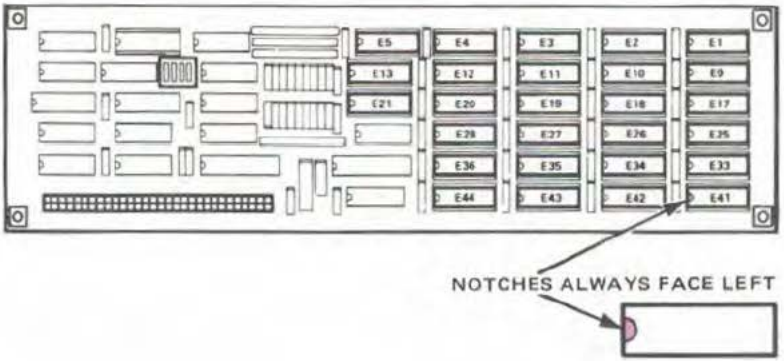
Memory Bank Number	Switch Number	Switch Position: No Chips	64K Chips	256K Chips
1	1	OFF	OFF	ON
2	2	OFF	OFF	ON
3	3	OFF	OFF	ON
—	4*	ON	ON	ON

*Factory set. Must always remain on.



Check chip positioning.

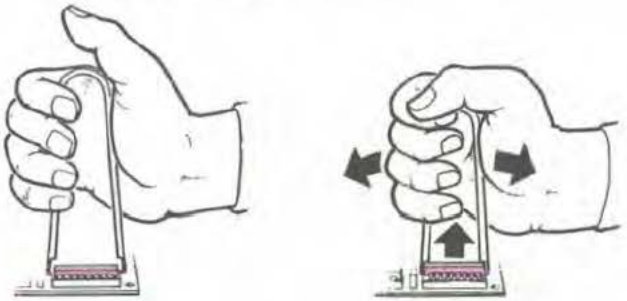
- Place the memory board in front of you as shown below.
- Make sure all nine chips in each bank are positioned with the notch on the end of each chip facing left.
- If any chip notch faces right, the chip *must* be repositioned (see page 45).



Fix any chip that is backwards or has a bent leg.

- Use your chip removal tool to remove the chip as follows.

  — Place the hooked edges of the tool between the memory chip and the socket. Squeeze and gently rock the chip from left to right until it is loose in the socket. Raise the chip straight up and out of the socket.



  — To prevent the legs from bending, use one hand to lift the removal tool and chip and the other hand to hold down the memory board.

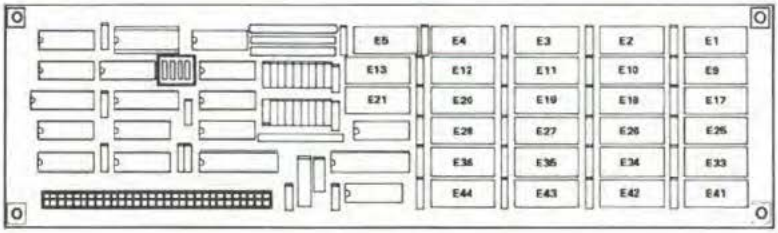
- To reinsert the chip, refer to page 46.

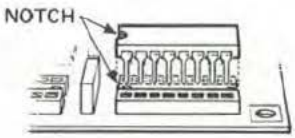
If the legs on your memory chip are not straight, lay the memory chip on its side and press the legs inward against a flat surface to straighten them.

Replace chip.

Before replacing a chip, make sure that its legs are straight (see page 45).

- Place the memory board option in front of you as shown below.
- Locate the notch on the end of the chip; then, insert the chip with the notch facing left. Do not bend the legs.





Run the memory test procedure again.

- After replacing or fixing a faulty chip, turn to page 32 and rerun the Memory (8088) test from the Rainbow diagnostic diskette. This test procedure will only find one failure at a time. Therefore, you must fix or replace each chip that causes the test to fail, then run the test again.
- Repeat this procedure until the Memory (8088) test is successful.

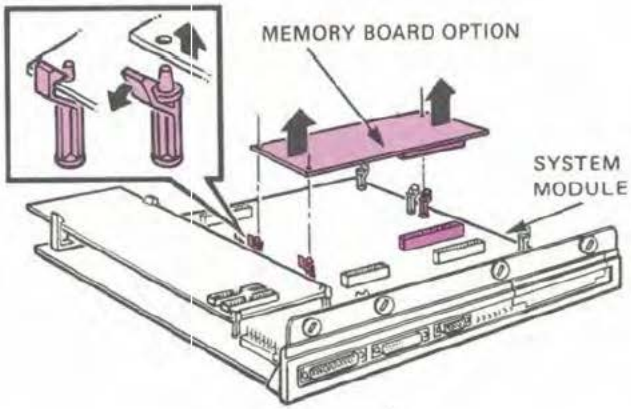
Memory Sizing Incorrect

If, after correcting any faulty memory chip, the computer continues to display the failure message "Memory Sizing Incorrect," make sure the switch settings on your memory board are correct for your configuration number.

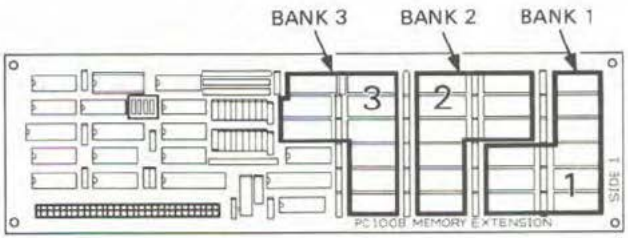
If you do not find any visible problem, return the upgrade kit or memory board option to your dealer. Remember to ship the memory board in its original protective packing material and shipping box.

If you do not know your configuration number, remove the memory board option.

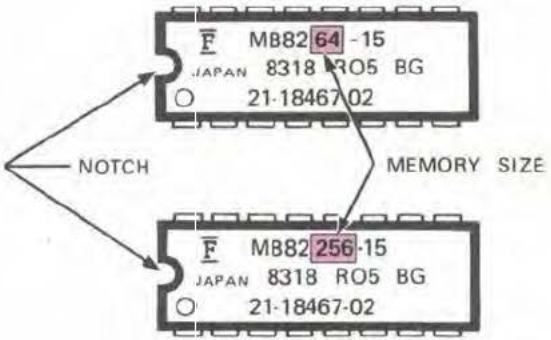
- Set the power switch to 0 (off), unplug the power cord, and remove the system module (see pages 5 through 15).
- Press outward on the three standoffs and lift the memory board option off the system module.



Place the memory board in front of you as shown.



Determine the size of the memory in each bank by comparing the chips to the following figures.



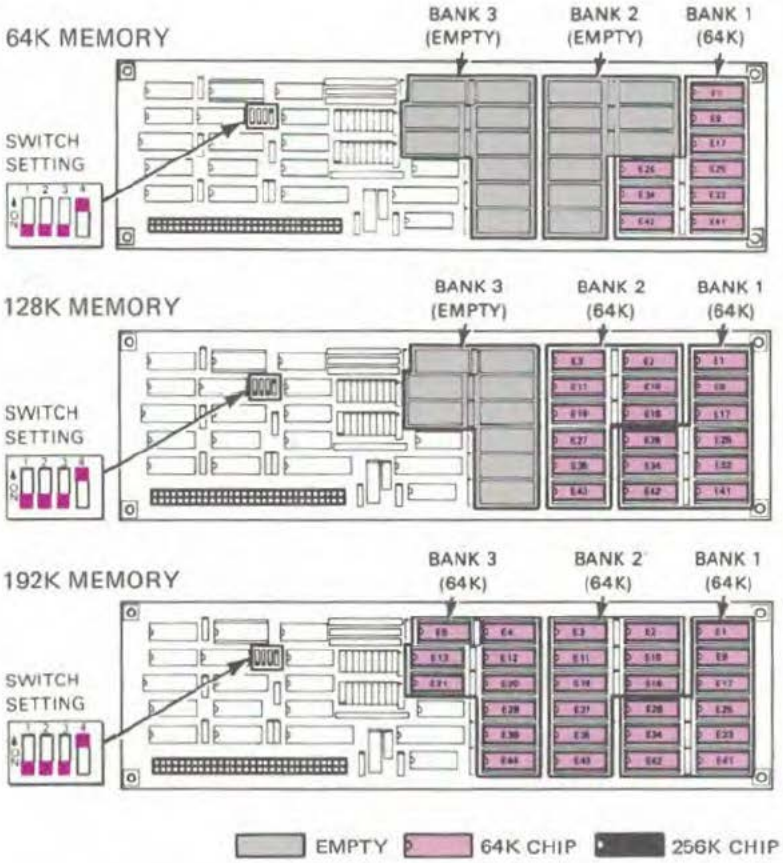
NOTE

The exact letters and numbers on the chips, other than the memory size, may be different on your memory board option. However, each bank must contain either all 64 or all 256 memory size chips. They cannot be intermixed within the same bank.

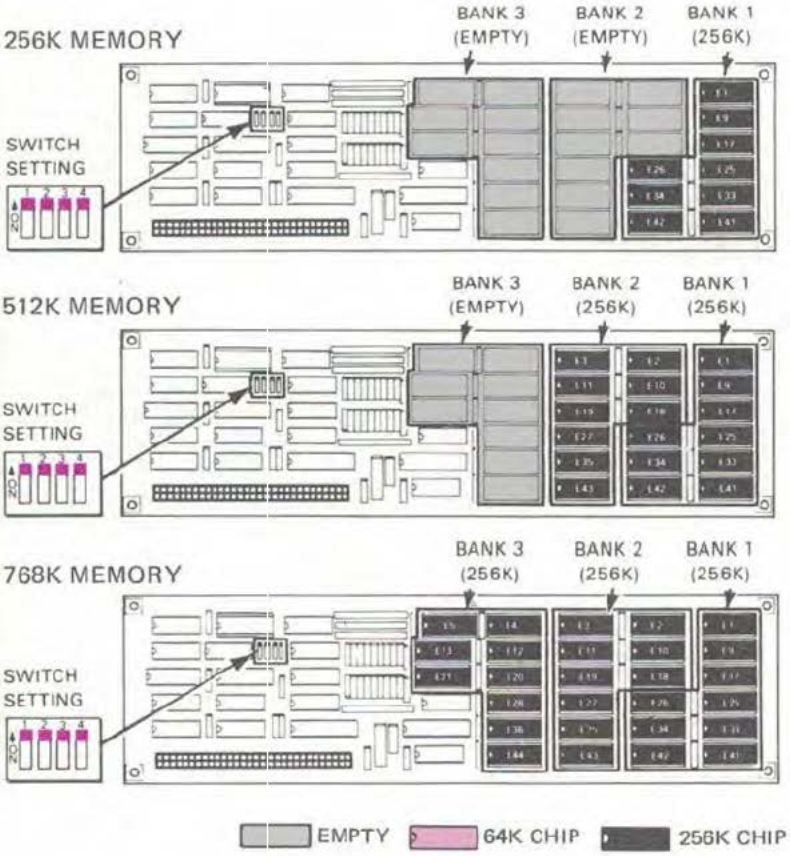
Compare your memory board chip sizes in each bank to the eight configurations shown in the following pages. Also, check the switch settings on your memory board option so they match those for your particular configuration number.

Once you find your configuration number, write it down on page 3 of this book for future reference.

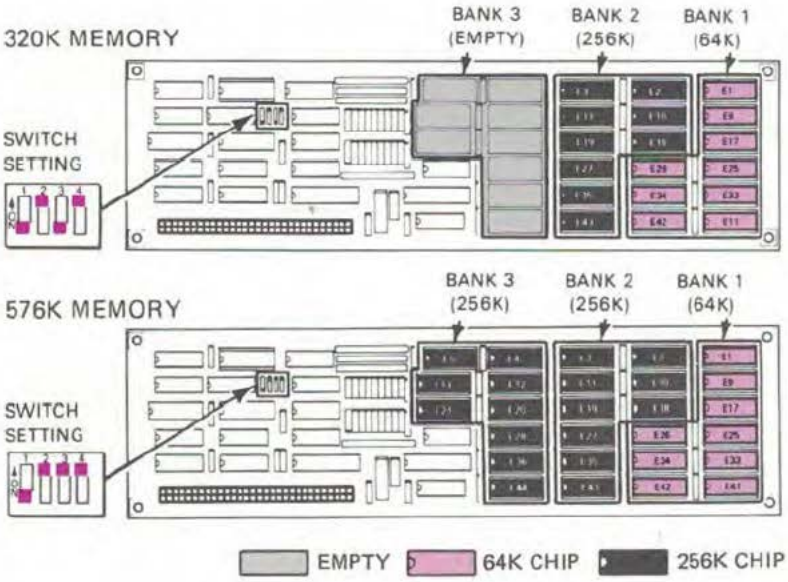
Configuration 1



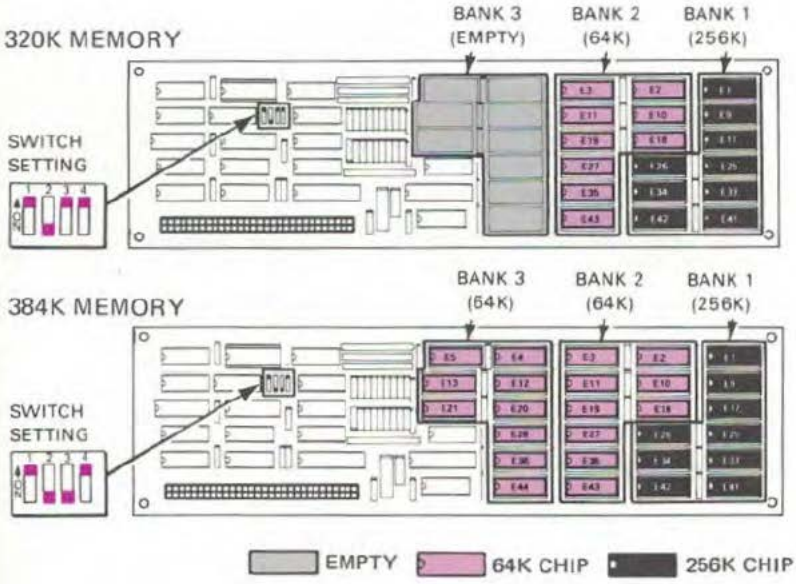
Configuration 2



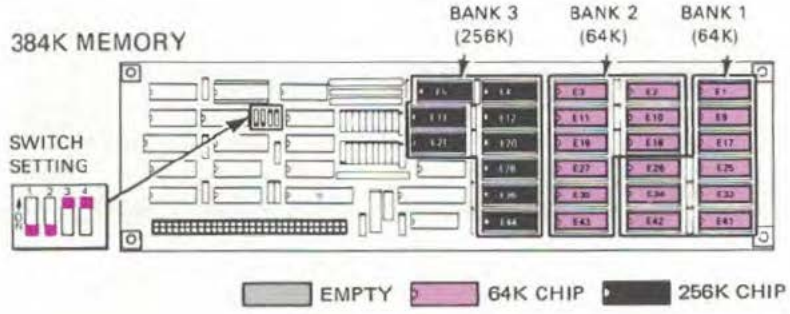
Configuration 3



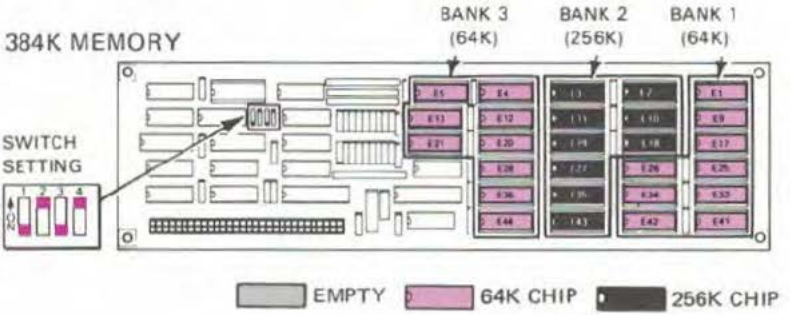
Configuration 4



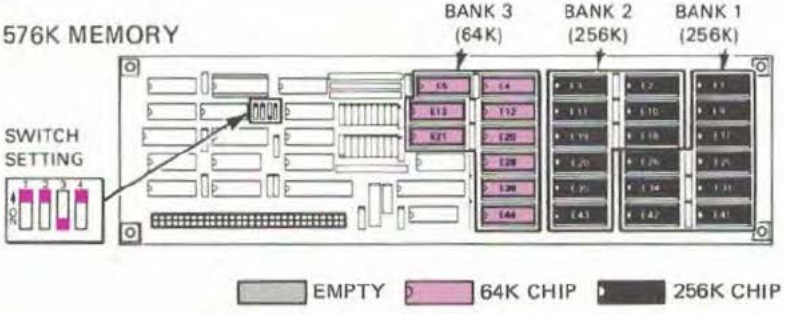
Configuration 5



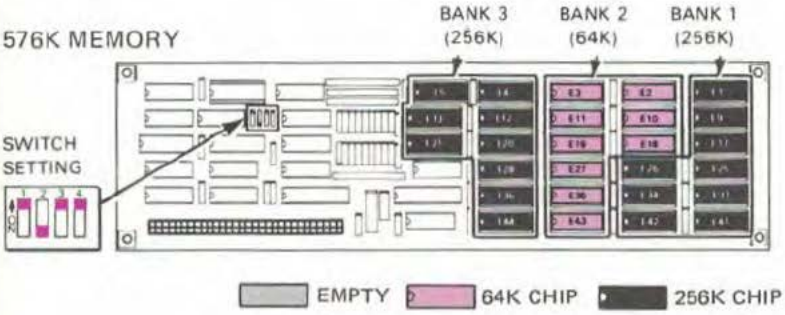
Configuration 6



Configuration 7



Configuration 8



Failure Code Table

When the computer displays a failure code on the screen and the configuration number of your memory board option is unknown, you can use the failure code table to locate the faulty chip without rerunning the test.

First, you must remove the memory board option from the system module to determine its configuration number. Then, using the configuration number and the failure code number, you can identify the faulty chip location from the failure code table.

Follow the instructions on the next page to use the table.

Using the table.

- Look for your configuration number at the top of the table.
- In the column(s) below that number, find your failure code.
- Then, on the same line, go to the far right column and locate the failing E chip number.

FAILURE CODE NUMBERS

CONFIGURATION NUMBERS								E NUM
#1	#2	#3	#4	#5	#6	#7	#8	
20	20 30 40 50	20	20 30 40 50	20	20	20 30 40 50	20 30 40 50	34
21	21 31 41 51	21	21 31 41 51	21	21	21 31 41 51	21 31 41 51	26
22	22 32 42 52	22	22 32 42 52	22	22	22 32 42 52	22 32 42 52	41
23	23 33 43 53	23	23 33 43 53	23	23	23 33 43 53	23 33 43 53	33
24	24 34 44 54	24	24 34 44 54	24	24	24 34 44 54	24 34 44 54	25
25	25 35 45 55	25	25 35 45 55	25	25	25 35 45 55	25 35 45 55	17
26	26 36 46 56	26	26 36 46 56	26	26	26 36 46 56	26 36 46 56	9
27	27 37 47 57	27	27 37 47 57	27	27	27 37 47 57	27 37 47 57	1
28	28 38 48 58	28	28 38 48 58	28	28	28 38 48 58	28 38 48 58	42
30	60 70 80 90	30 40 50 60	60	30	30 40 50 60	60 70 80 90	60	35
31	61 71 81 91	31 41 51 61	61	31	31 41 51 61	61 71 81 91	61	27
32	62 72 82 92	32 42 52 62	62	32	32 42 52 62	62 72 82 92	62	19
33	63 73 83 93	33 43 53 63	63	33	33 43 53 63	63 73 83 93	63	11
34	64 74 84 94	34 44 54 64	64	34	34 44 54 64	64 74 84 94	64	3
35	65 75 85 95	35 45 55 65	65	35	35 45 55 65	65 75 85 95	65	18
36	66 76 86 96	36 46 56 66	66	36	36 46 56 66	66 76 86 96	66	10
37	67 77 87 97	37 47 57 67	67	37	37 47 57 67	67 77 87 97	67	2
38	68 78 88 98	38 48 58 68	68	38	38 48 58 68	68 78 88 98	68	13
40	A0 B0 C0 D0	70 80 90 A0	70	40 50 60 70	70	A0	70 80 90 A0	36
41	A1 B1 C1 D1	71 81 91 A1	71	41 51 61 71	71	A1	71 81 91 A1	28
42	A2 B2 C2 D2	72 82 92 A2	72	42 52 62 72	72	A2	72 82 92 A2	20
43	A3 B3 C3 D3	73 83 93 A3	73	43 53 63 73	73	A3	73 83 93 A3	12
44	A4 B4 C4 D4	74 84 94 A4	74	44 54 64 74	74	A4	74 84 94 A4	4
45	A5 B5 C5 D5	75 85 95 A5	75	45 55 65 75	75	A5	75 85 95 A5	21
46	A6 B6 C6 D6	76 86 96 A6	76	46 56 66 76	76	A6	76 86 96 A6	13
47	A7 B7 C7 D7	77 87 97 A7	77	47 57 67 77	77	A7	77 87 97 A7	5
48	A8 B8 C8 D8	78 88 98 A8	78	48 58 68 78	78	A8	78 88 98 A8	44

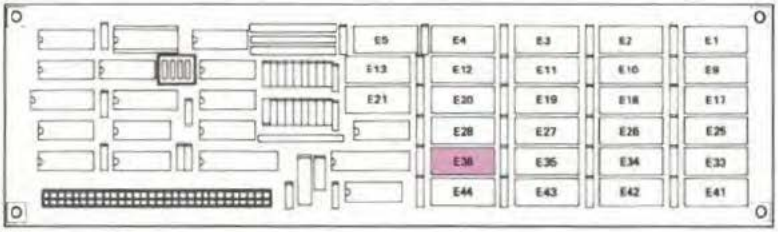
Example for failure code 70:

1. If you have configuration 3, look for column head #3.
2. Look down the column(s) for your failure code. In this example, it is 70.
3. On the same line, go to the far right column. This E number is the location on the memory board of the chip that failed.

The location of the E number for this example is highlighted in color below.

Once you correct or replace the failing chip, install your memory board and run this memory test procedure again.

Note your configuration number on page 3 for future reference.



What to Do Next

1. Install other options, if you have them. Digital Equipment Corporation supplies installation guides with each option.
2. Install the system unit in the floor stand, if you have one.
3. Reconnect your computer to another system, if applicable.

Bits and Bytes

Codes using 1s and 0s have been developed to represent all of the information that the Rainbow computer uses. Each 1 and 0 in the code is known as a bit. A bit stands for binary digit. The following terms and values have been assigned.

Terms	Value
Bit	1 or 0
Byte	8 bits
K bytes	1,024 bytes (or 8,192 bits)

It takes one byte (8 bits of disk space or system memory) to store one character symbol.

A typewritten page holds an average of 250 words or about 1,500 characters and spaces. It takes 1,500 bytes (12,000 bits of computer memory to store that many characters. Therefore, it takes approximately:

- 1,500 bytes of Rainbow memory to hold an average typewritten page.
- 64,000 bytes (64K) of Rainbow memory to hold 43 average typewritten pages.
- 128K of Rainbow memory to hold 86 average typewritten pages.

Adding Memory.

Rainbow memory upgrade kits are available to increase the size of your new Rainbow memory board. Each memory upgrade kit contains the following items.

- Upgrade instructions
- 9 memory chips (to fill on memory bank)
- 1 removal tool

Additional Memory Size	Number of Chips	Upgrade Kit Order Number
64K bytes	9	PC1XX-AY
256K bytes	9	PC1XX-AZ

Total memory size can range from 128K to a maximum of 896K in varying additions of 64K or 256K.

Maximum memory size:

128K bytes resident in the system module
\+ 768K bytes upgraded memory board (maximum)
= 896K bytes of maximum total memory

EK-RBMXE-IN-002
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READER'S COMMENTS

Rainbow™ Memory Board Option
Installation Guide with Testing Procedures EK-RBMXE-IN-002

Your comments and suggestions will help us in our continuing efforts to improve the quality and usefulness of our documents.

How would you rate this Guide in the following categories?

	Excellent	Very Good	Good	Fair	Poor
Accuracy	☐	☐	☐	☐	☐
Completeness	☐	☐	☐	☐	☐
Concreteness	☐	☐	☐	☐	☐
Clearness	☐	☐	☐	☐	☐
Consistency	☐	☐	☐	☐	☐
Relevance	☐	☐	☐	☐	☐
Organization	☐	☐	☐	☐	☐
Visual Appeal	☐	☐	☐	☐	☐
Ease of Use	☐	☐	☐	☐	☐
Overall Rating	☐	☐	☐	☐	☐

Did you have any problems installing this option?

No ☐ Yes ☐ Please describe _____

_____

_____

Comments or suggestions _____

_____

_____

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